REMARKS

Claims 1-11 stand rejected under 35 U.S.C. § 112, second paragraph, for indefiniteness. In response to this rejection, "normal plasma" has been defined in claim 1, each instance of "faulty" in the claims has been deleted, and each instance of "optical detector" in claims 3 and 4 has been amended to "detector". It is believed that the foregoing amendments overcome the rejection of claims 1-11 under 35 U.S.C. § 112, second paragraph, in the Office Action.

Claims 1, 2, 3, 6, and 9 stand rejected under 35 U.S.C. § 103(a) for obviousness from the various teachings of U.S. Patent No. 5,383,019 to Farrell et al.; U.S. Patent Publication No. US 2002/0071117 to Ukon et al.; U.S. Patent No. 5,642,190 to Krupa et al.; U.S. Patent No. 3,692,415 to Shiller; U.S. Patent No. 6,526,355 to Ni et al.; and U.S. Patent Publication No. US 2003/0192864 to Tanaka et al.

Herein, claims 1-6, 9, and 11 have been amended; new independent method claim 14 corresponding to apparatus claim 1 has been added; and new dependent claims 12 and 13, including the same limitations as claim 5 but depending from claims 1 and 2, respectively, have been added. After the foregoing amendments, claims 1-14 are pending in the application. Support for each claim amendment and new claims 12-14 is found in the application as originally filed.

Claims 1 and 6:

In the detailed rejection of claim 1, the Examiner admits that the Farrell et al. patent does not show a detector for detecting a change in the plasma from the normal plasma to the toroidal plasma. However, the Examiner argues that in view of the Ukon et al. publication, which discloses optically detecting the plasma status, it would have been obvious to control the operating conditions or performances of the plasma torch to either shut down or interrupt the plasma generator depending on the detected plasma status, including the changing status from the normal plasma shape to a faulty shape, for establishing a desired torch condition. Reconsideration is requested.

The Ukon et al. publication merely discloses monitoring and recording the plasma status. It does not teach or suggest taking any action to shut down the plasma if it changes from

a normal plasma to a toroidal plasma. To this end, the Ukon et al. publication discloses no diagnostic ability and, in particular, makes no suggestion of how to determine that a toroidal plasma has arisen. Moreover, the Ukon et al. publication is not concerned with diagnosis. Rather, paragraph [0013] of the Ukon et al. publication discloses "...it is almost impossible to explain the situation to the manufacturer in the absence of any plasma image". Paragraph [0022] of the Ukon et al. publication discloses that plasma status can be monitored and displayed. Also, or alternatively, plasma image data can be stored and processed, i.e., obtaining intensity images, intensity contour, color contour, intensity outline, and time base fluctuation of image data. The image data and the measured data of the plasma can then be reviewed later on. There is, however, no disclosure, teaching, or suggestion in the Ukon et al. publication of use of the plasma image for control of a spectrometer.

Moreover, neither the Farrell et al. patent nor the Ukon et al. publication disclose a control section that, if provided with information indicating that a normal plasma has changed into a toroidal plasma, responds in the manner set forth in claim 1. To this end, it is noteworthy that the Ukon et al. publication at no time refers to toroidal plasmas. In fact, Ukon is concerned with observing far more modest changes in the plasma. For example, paragraph [0012] of the Ukon et al. publication explains that "when the plasma torch is replaced, it may happen that due to small changes of the torch structure the gas conditions are changed for optimisation". Paragraph [0013] of the Ukon et al. publication refers to "troubles with the plasma such as fluctuation of the position or of the shape or generation of strange sounds". Thus, the Ukon et al. publication does not mention anything more serious than plasma optimization and fluctuations, and certainly makes no reference to the collapsing of a normal plasma to a toroidal plasma.

As noted in paragraph [0030] of the publication of the subject application, namely, US 2007/0221634, failure to shut down the torch of the spectrometer promptly, upon the collapse of a normal plasma into a toroidal plasma, can result in the melting of the tube and the destruction of the torch. In certain applications, this requires a response in one second or even 0.57 seconds. Hence, the approach disclosed in the Ukon et al. publication of processing plasma image data or storing said image data and measured data of the plasma for review later on teaches away from the approach of the present invention.

Absent disclosing, teaching, or suggesting a spectrometer having all the limitations of claims 1 and 6, the Farrell et al. patent and the Ukon et al. publication, either individually or in combination, cannot anticipate or render obvious these claims, or claims 2-5 and 7-13 dependent therefrom.

Claim 2:

As discussed above in connection with claim 1, there is no suggestion in the Ukon et al. publication of how one might detect a collapse of a normal plasma into a toroidal plasma, or of any motivation for doing so, especially given the Ukon et al. publication's reference to plasma "optimisation" and "fluctuations".

Absent disclosing, teaching, or suggesting a spectrometer having all the limitations of claim 2, the Farrell et al. patent and the Ukon et al. publication, either individually or in combination, cannot anticipate or render obvious claim 2.

Claims 10-11:

While paragraph [0045] of the Tanaka et al. publication discloses the use of a status detecting means 8a which can be utilized for impedance monitoring, the Tanaka et al. publication does not disclose, teach, or suggest determining the impedance value of the plasma in order to determine the change from the normal plasma to the toroidal plasma. To this end, the mere disclosure in the Tanaka et al. publication of monitoring impedance does not disclose the detailed limitations of claims 10-11 of determining the impedance value of the plasma in order to determine the change from the normal plasma to the toroidal plasma. The Farrell et al. patent and the Ukon et al. publication do not cure this deficiency in the teachings of the Tanaka et al. publication.

Absent disclosing, teaching, or suggesting a spectrometer having all the limitations of claims 10-11, the Farrell et al. patent, the Ukon et al. publication, and the Tanaka et al. publication, either individually or in combination, cannot anticipate or render obvious these claims.

Claim 14:

New claim 14 is a method of controlling a plasma torch. The method includes producing a normal plasma in a tube of the spectrometer. The normal plasma is constrained

within the tube, is separated from the tube and is capable of collapsing into a toroidal plasma. A detector detects a change in the plasma from the normal plasma to the toroidal plasma. A signal is received from the detector at a control section. The control section determines the change in the plasma from the normal plasma to the toroidal plasma. The torch is shut down with the control section when the control section determines that the plasma changes from the normal plasma to the toroidal plasma.

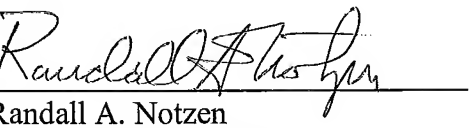
For the reasons discussed above in connection with claim 1, the Farrell et al. patent and the Ukon et al. publication, either individually or in combination, cannot disclose all the limitations of method claim 14.

CONCLUSION

Based on the foregoing Amendments and Remarks, reconsideration of the rejections and allowance of claims 1-14 are requested.

Respectfully submitted,

THE WEBB LAW FIRM

By 

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